

WHAT IS CLAIMED IS:

1. A method for controlling a refrigeration system, the refrigeration system including at least one refrigeration compartment and a quick chill/thaw pan located in the refrigeration compartment, a main controller board, a temperature adjustment board, a dispenser board and a serial communications bus, the main controller board electrically connected to the temperature adjustment board and the dispenser board through the serial communications bus for controlling the temperature of the chill/thaw pan, said method comprising the steps of:

5 accepting a plurality of user-selected inputs including at least a refrigeration compartment temperature and a quick chill/thaw mode;

10 determining a state of the refrigeration system;

transmitting a command over the serial communications bus; and

executing a plurality of algorithms to control the refrigeration compartment and quick chill/thaw pan based on the command transmitted over the serial communications bus.

15 2. A method in accordance with Claim 1 wherein the refrigeration system further includes a human machine interface board operatively coupled to the main controller board, the human machine interface including a plurality of keys for user manipulation to select refrigeration features, said step of accepting a plurality of user-selected inputs comprises the step of debouncing the keys when manipulated by a user.

20 25 3. A method in accordance with Claim 1 wherein said step of determining a state of a refrigeration system comprises the step of acquiring status information, the status information comprising at least one of timer status, fresh food fan status, condenser fan status, evaporator fan status, quick chill/thaw pan fan status, compressor status, heater status, door open/close status, alarm status, and cradle status.

4. A method in accordance with Claim 3 wherein said step of determining a state of the refrigeration system comprises the step of determining if the refrigerator is in at least one of an initialize mode, a prechill mode, a normal cooling

mode, an abnormal cooling mode, a defrost mode, a diagnostic mode, and a dispense mode based on the status information.

5 5. A method in accordance with Claim 1 wherein said step of transmitting a command over the serial communications bus further comprises the step of transmitting a command to at least one of a dispenser board and a temperature adjustment board.

10 6. A method in accordance with Claim 1 wherein said step of executing a plurality of algorithms comprises the step of executing an algorithm to control operation of at least one of resetting a water filter, dispensing water, dispensing crushed ice, dispensing cubed ice, toggling a light, and locking a keypad.

15 7. A method in accordance with Claim 1 wherein said step of executing a plurality of algorithms further comprises the step of executing a sealed system algorithm to control operation of at least one of a defrost heater, an evaporator fan, a compressor, and a condenser fan based on the refrigerator set temperature.

15 8. A method in accordance with Claim 1 wherein said step of executing a plurality of algorithms further comprises the step of executing a fresh food fan algorithm to control operation of a fresh food fan based on opening/closing a door and the refrigerator set temperature.

20 9. A method in accordance with Claim 1 wherein said step of executing a plurality of algorithms further comprises the step of executing a sensor-read-and-rolling-average algorithm to calibrate and store a calibration slope and offset.

25 10. A method in accordance with Claim 1 wherein said step of executing a plurality of algorithms further comprises the step of executing a defrost algorithm.

11. A method in accordance with Claim 10 wherein said step of executing a defrost algorithm comprises the step of controlling a heater, a compressor, and a plurality of fans.

30 12. A control system for a refrigeration system, said refrigeration system including at least one refrigeration compartment and a quick chill/thaw pan located in the refrigeration compartment, said control system comprising:

a main controller board;
a temperature adjustment board;
a dispenser board; and

5 a serial communications bus, said main controller board electrically connected to said temperature adjustment board and said dispenser board through said serial communications bus for controlling the temperature of the refrigeration compartment and the quick chill/thaw pan, said control system configured to:

accept a plurality of inputs including at least a refrigeration compartment temperature and a quick chill/thaw mode;

10 determine a state of said refrigeration system;

transmit a command over said serial communications bus; and

execute a plurality of algorithms to control said refrigeration compartment and said quick chill/thaw pan based on the command transmitted over said serial communications bus.

15 13. A control system in accordance with Claim 12 wherein said refrigeration system further includes a human machine interface board operatively coupled to said main controller board, said human machine interface including a plurality of keys for user manipulation to select refrigerator features, said main controller board accepts user-selected inputs.

20 14. A control system in accordance with Claim 13, said control system further configured to debounce said keys when manipulated by a user.

25 15. A control system in accordance with Claim 12, said control system further configured to acquire status information, said status information comprising at least a timer status, a fresh food fan status, a condenser fan status, a evaporator fan status, a quick chill/thaw pan fan status, a compressor status, a heater status, a door open/close status, an alarm status, and a cradle status.

16. A control system in accordance with Claim 15, said control system further configured to determine a refrigeration mode based on said status information, wherein said refrigeration mode comprises at least one of an initialize mode, a prechill

mode, a normal cooling mode, an abnormal cooling mode, a defrost mode, a diagnostic mode, and a dispense mode.

5 17. A control system in accordance with Claim 12, said control system further configured to transmit a command over said serial communications to at least one of said dispenser board and said temperature adjustment board.

10 18. A control system in accordance with Claim 12, said control system further configured to execute an algorithm to control operation of at least resetting a water filter, dispensing water, dispensing crushed ice, dispensing cubed ice, toggling a light, and locking a keypad.

15 19. A control system in accordance with Claim 12, said control system further configured to execute a sealed system algorithm based on said refrigerator set temperature to control operation of at least one of a defrost heater, an evaporator fan, a compressor, and a condenser fan.

20 20. A control system in accordance with Claim 12, said control system further configured to execute a fresh food fan algorithm to control operation of a fresh food fan based on opening/closing a door and said refrigerator set temperature.

25 21. A control system in accordance with Claim 12, said control system further configured to execute a sensor-read-and-rolling-average algorithm to calibrate and store a calibration slope and offset.

22. A control system in accordance with Claim 12, said control system further configured to execute a defrost algorithm.

23. A control system in accordance with Claim 22, said control system further configured to control a heater, a compressor and a plurality of fans when executing a defrost algorithm.

24. A control system in accordance with Claim 12 wherein said main controller board comprises a microcontroller electrically connected to a comparator circuit, a reset circuit, a clock circuit, an evaporator/condenser fan control, a plurality of DC motor drivers, an EEPROM, a stepper motor, an interrupt circuit, a communications circuit, a relay circuit, a biasing circuit, and a power supply circuit.

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25. A control system in accordance with Claim 12 wherein said dispenser board comprises a microcontroller electrically connected to a reset circuit, a clock circuit, an alarm circuit, lamp circuit, a heater control circuit, a cup switch circuit, a communications circuit, a test circuit, a dispenser selection circuit, and a LED driver circuit.

26. A control system in accordance with Claim 12 wherein said temperature adjustment board comprises a microcontroller electrically connected to a reset circuit, a clock circuit, an alarm circuit, a communications circuit, a test circuit, a level shifting circuit, and a driver circuit.

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27. A control system for a refrigeration system, said refrigeration system including at least one refrigeration compartment, a quick chill/thaw pan located in the refrigeration compartment, said control system comprising:

an electronic controller; and

15 a serial communications bus, said controller electrically connected to said quick chill/thaw pan and said serial communications bus, said controller configured to:

accept a plurality of inputs including at least a refrigeration compartment temperature and a quick chill/thaw mode;

determine a state of said refrigeration system;

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transmit a command over said serial communications bus; and

execute a plurality of algorithms to control said refrigeration compartment and said quick chill/thaw pan based on the command transmitted over said serial communications bus.

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28. A control system for a refrigeration system, said refrigeration system including at least one refrigeration compartment and a quick chill/thaw pan located in the refrigeration compartment, said control system comprising:

an electronic controller; and

an HMI board comprising a plurality of input selection keys, said controller electrically connected to said HMI board and configured for user selection of a quick chill mode and a quick thaw mode.

5 29. A control system in accordance with Claim 28 wherein said input selector keys comprising at least one of a quick chill key and a quick thaw key.

10 30. A control system in accordance with Claim 28 wherein said electronic controller comprises:

a main control board;

a temperature adjustment board;

15 a dispenser board; and

a serial communications bus, said main controller board electrically connected to said temperature adjustment board and said dispenser board through said serial communications bus for controlling the temperature of said refrigeration compartment and said quick chill/thaw pan.

20 31. A control system in accordance with Claim 29, said electronic controller configured to:

accept a plurality of inputs including at least a refrigeration compartment temperature and a quick chill/thaw mode;

determine a state of said refrigeration system;

transmit a command over said serial communications bus; and

execute a plurality of algorithms to control said refrigeration compartment and said quick chill/thaw pan based on the command transmitted over said serial communications bus.